

For complaints such as:      On/off ratio cannot be regulated, poor warm-up characteristics of engine, hunting at idle, engine not accepting gas or splashing during acceleration, proceed as follows:

Check lambda control.

Check air injection.

Check fuel evaporation control system.

Assumption:                    CIS injection system and ignition system in order.

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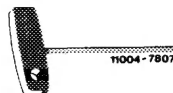
**Special tools**

Oil telethermometer



116 589 27 21 00

Allen wrench for hex socket  
screw 3 mm



000 589 14 11 00

Adapter for checking electric  
lines and components

110 589 14 21 00

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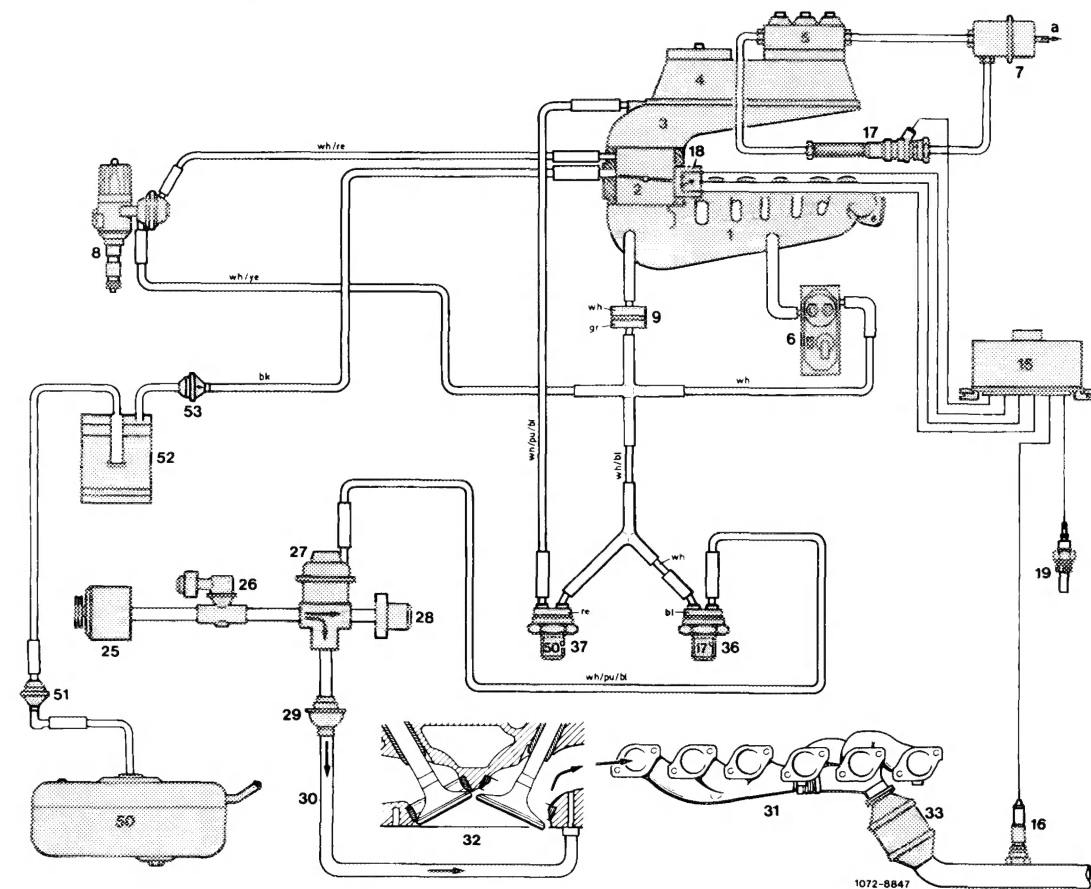
**Conventional tools**

Revolution counter, multimeter (volt-ohmmeter)

Lambda control tester

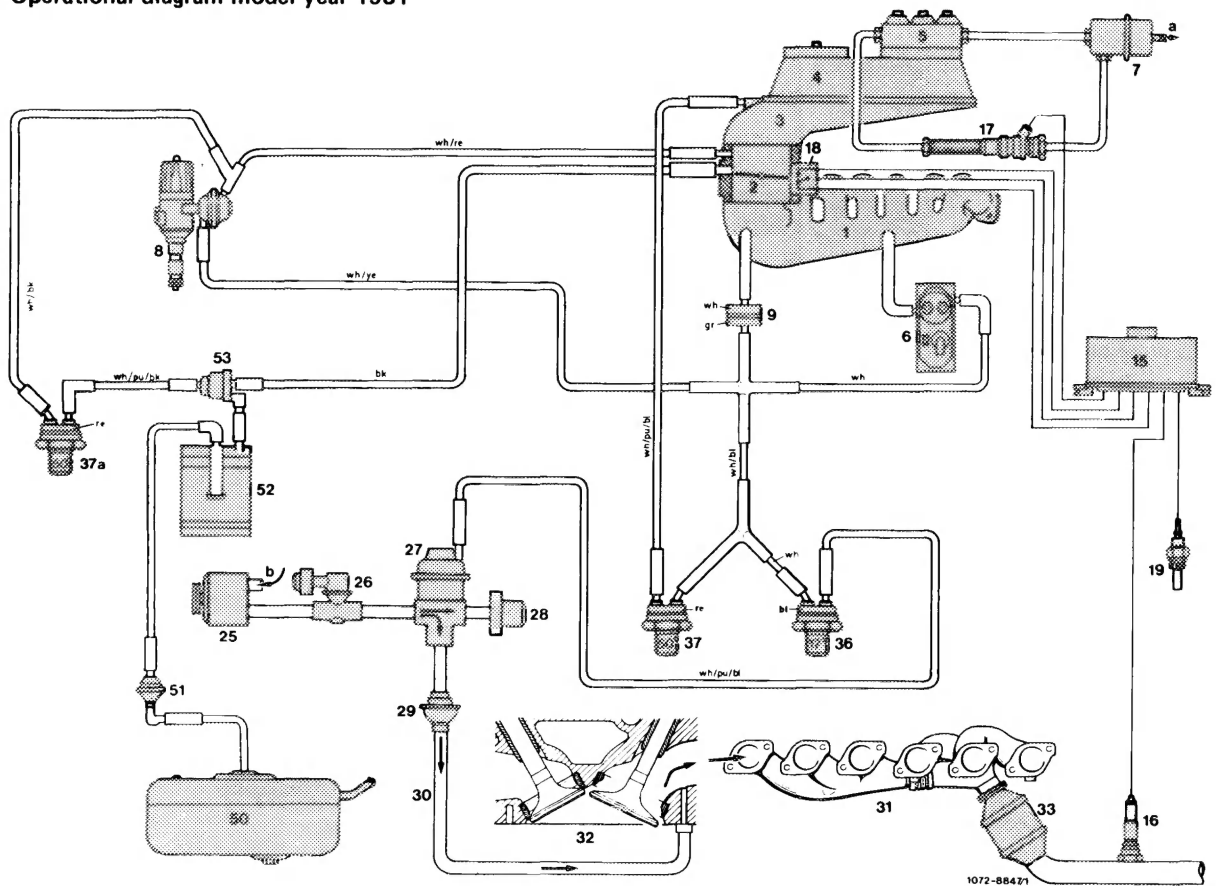
KDJE–P 600

# Operational diagram model year 1980



- |                          |                             |                       |   |
|--------------------------|-----------------------------|-----------------------|---|
| 1 Intake manifold        | 16 Oxygen sensor            | 31 Exhaust manifold   | Color code<br>bk = black<br>bl = blue<br>gr = green<br>ye = yellow<br>re = red<br>wh = white<br>pu = purple |
| 2 Throttle valve housing | 17 Frequency valve          | 32 Cylinder head      |   |
| 3 Air guide housing      | 18 Throttle valve switch    | 33 Primary catalyst   |   |
| 4 Air flow sensor        | 19 Temperature switch oil   | 36 Thermovalve        |   |
| 5 Volume distributor     | 16 °C/61 °F                 | 37 Thermovalve        |   |
| 6 Warm-up compensator    | 25 Air pump                 | 50 °C/122 °F          |   |
| 7 Damper                 | 26 Pressure relief valve    | 50 Fuel tank          |   |
| 8 Ignition distributor   | 27 Diverter valve           | 51 Vent valve unit    |   |
| 9 Orifice                | 28 Damper filter (silencer) | 52 Charcoal canister  |   |
| 15 Control unit          | 29 Check valve              | 53 Purge valve        |   |
|                          | 30 Injection line           | a Leak-off connection |   |

## Operational diagram model year 1981



- |                          |                             |                        |   |
|--------------------------|-----------------------------|------------------------|---|
| 1 Intake manifold        | 18 Throttle valve switch    | 36 Thermostatic valve  | Color code<br>bk = black<br>bl = blue<br>gr = green<br>ye = yellow<br>re = red<br>wh = white<br>pu = purple |
| 2 Throttle valve housing | 19 Temperature switch oil   | 37 Thermostatic valve  |   |
| 3 Air guide housing      | 16 °C/61 °F                 | 37a Thermostatic valve |   |
| 4 Air flow sensor        | 25 Air pump                 | 50 °C/122 °F           |   |
| 5 Fuel distributor       | 26 Pressure relief valve    | 50 °C/122 °F           |   |
| 6 Warm-up compensator    | 27 Diverter valve           | 50 Fuel tank           |   |
| 7 Damper                 | 28 Damper filter (silencer) | 51 Vent valve unit     |   |
| 8 Ignition distributor   | 29 Check valve              | 52 Charcoal canister   |   |
| 9 Orifice                | 30 Injection line           | 53 Purge valve         |   |
| 15 Control unit          | 31 Exhaust manifold         | a Leak-off connection  |   |
| 16 Oxygen sensor         | 32 Cylinder head            | b From air cleaner     |   |
| 17 Frequency valve       | 33 Primary catalyst         |                        |   |

### A. Quick test with lambda control tester KDJE-P 600

The lambda control tester can be used for adjusting on/off ratio at idle, but also for a quick diagnosis of lambda control.

Connect lambda control tester to diagnosis socket and revolution counter. Connect oil telethermometer.

**Note:** If the specified nominal value is not attained, refer to quick test with adapter.

Scope of test	Actuation	Readout/nominal value
a) Engine oil temperature < 13 °C/55 °F	Engine at idle	Constant between 56–64 %
b) Simulation	Pull plug from temperature switch 16 °C/61 °F and connect to ground	Readout as above

#### Warm-up control

a) Engine oil temperature > 20 °C/68 °F, oxygen sensor not yet ready for operation (< approx. 300 °C/572 °F)	Engine at idle	Constant between 46–54 %
b) Simulation	Separate plug of oxygen sensor	Readout as above

#### Control at operating temperature

Engine oil temperature approx. 80 °C, oxygen sensor ready for operation (> approx. 300 °C)	Engine at idle	50 % ± 10 % slowly swinging needle
Idle contact closed	Throttle valve at idle stop	Deflection of needle approx. 8–12 % around nominal value
Idle contact open	Slightly open throttle valve	Deflection of needle approx. 13–23 % around nominal value
Full throttle contact closed	Apply full throttle for a short moment	Constant between 56–64 %
Lean stop control unit	Separate plug of oxygen sensor, connect plug of control unit to 2 volt output of tester <b>for a short moment</b>	Constant < approx. 20 %  < approx. 20 %
Rich stop control unit	Separate plug of oxygen sensor, connect plug for control unit to ground <b>for a short moment</b>	Constant > approx. 87 %
Air injection	Pull blue/purple vacuum line from air guide housing and close <b>for a short moment</b>	Constant approx. 87 %



## B. Quick test with adapter

Connect adapter to plug, control unit and multimeter to adapter.

Test set-up	Circuit or component tested	Setting of controls	Specified value . . . If deviating, see individual component test program sections
Adapter to position 1 with voltmeter	Supply voltage	Ignition turned on	U = 12 ± 2 V light on If deviating, see section I.
Adapter to position 2 with ohmmeter	Throttle valve switch	Ignition off Idle position . . . Full throttle position . . .	R = ∞ Ω R = 0 Ω If deviating, see sections IV and V.
	Switch 16 °C/ 61 °F	Ignition off	< 13 °C R = 0 Ω > 19 °C R = ∞ Ω If deviating, see sections II and III.
Adapter to position 3 with ohmmeter	Throttle valve switch	Ignition off Idle position . . .	R = 0 Ω
		Advance slightly throttle linkage . . .	R = ∞ Ω If deviating, see sections IV and V.
Adapter to position 4 with voltmeter	Frequency valve	Ignition on Crank engine	U = 12 ± 2 V If deviating, see sections VI and IX.
Adapter to position 5 with ohmmeter	Oxygen sensor probe cable and connection to electronic control unit	Ignition off	R = ∞ Ω
		Pull off oxygen sensor connection and bridge plug going to electronic control unit	R = 0 Ω If deviating, see sections VII and VIII.
Disconnect adapter and re-insert plug into control unit. Connect lambda control tester		Run engine until operating temperature is attained	On/off ratio = 50 % ± 10 % If deviating, see section X.
Pull blue/purple vacuum line from air guide housing and close		Start engine for a short moment	On/off ratio = >80 % If deviating, see section XI.
Pull draw-off line (purge line) to throttle valve housing from charcoal canister		Start engine Idle  approx. 2000/min	No vacuum  Vacuum available If deviating, see section XII.

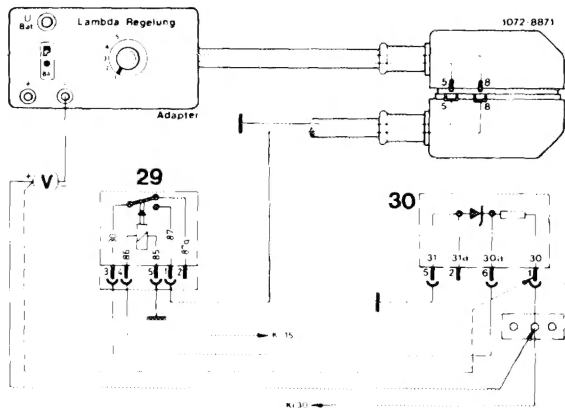
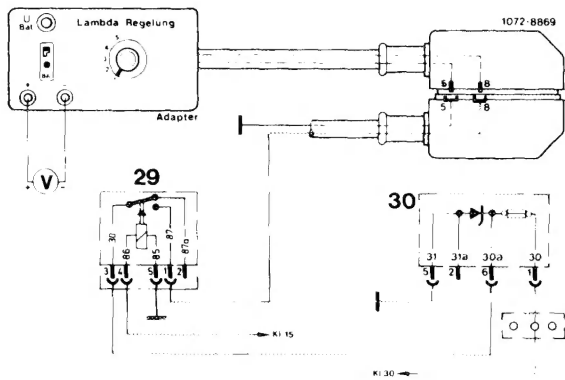
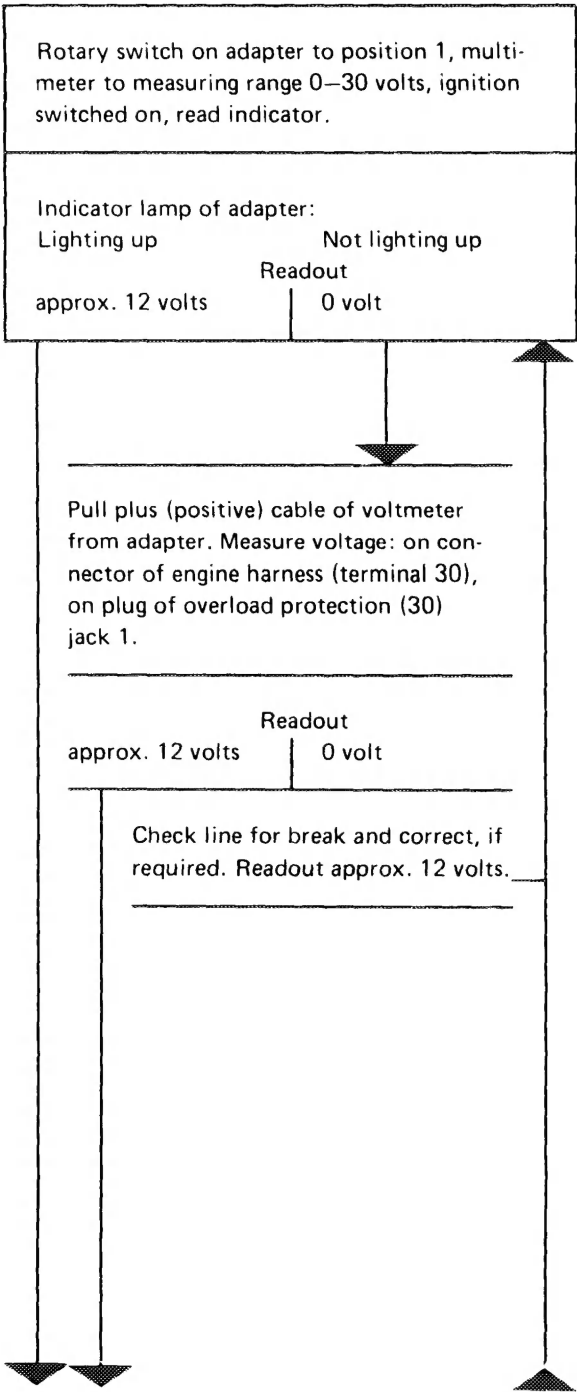
C. Component test program

Test section A

Test conditions:                      Connect adapter to plug, control unit and multimeter to adapter.

   Connect oil telethermometer.

I. Testing voltage supply of control unit



Attach overload protection (30) to plug in such a manner that the voltage on terminal 6 can be measured with plus (positive) cable of voltmeter.

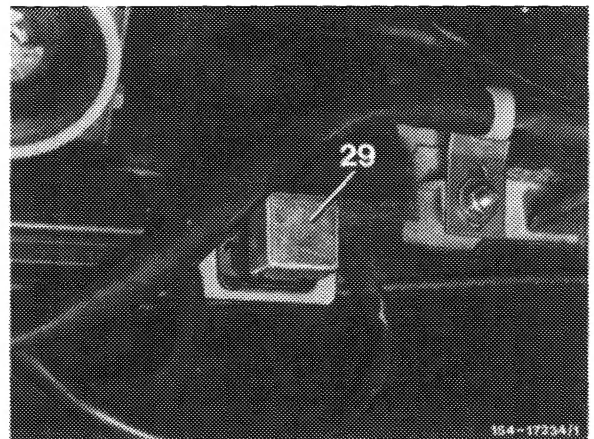
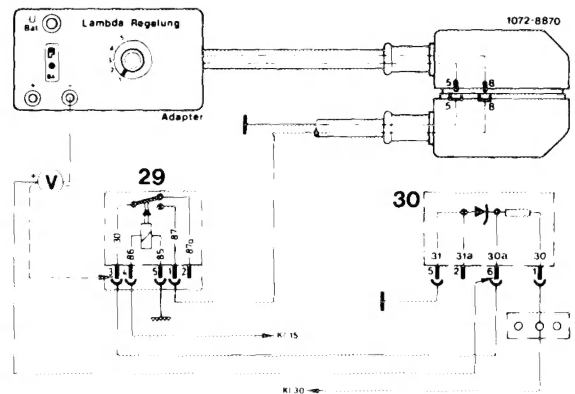
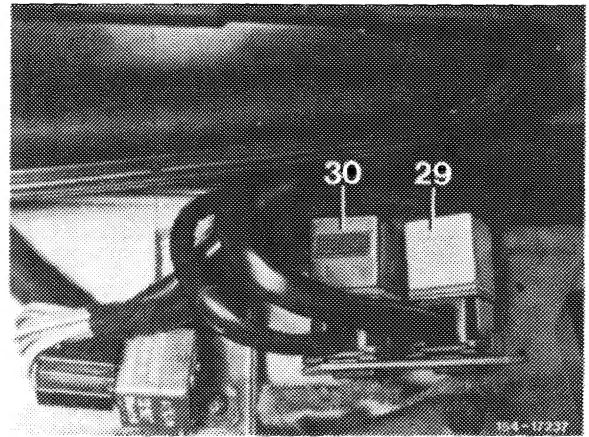
Readout  
approx. 12 volts | 0 volt

Renew overload protection (30).  
Readout approx. 12 volts

Attach relay for voltage supply (29) to plug in such a manner that voltage on jack 3 can be measured with plus (positive) cable of voltmeter.

Readout  
approx. 12 volts | 0 volt

Check line to overload protection for break and correct, if required.  
Readout approx. 12 volts.



Check voltage on jack 4 with ignition switched on.

Readout  
approx. 12 volts | 0 volt

Check line to terminal 15 for break and correct, if required.  
Readout approx. 12 volts.

Connect voltmeter to jack 3 and 5.

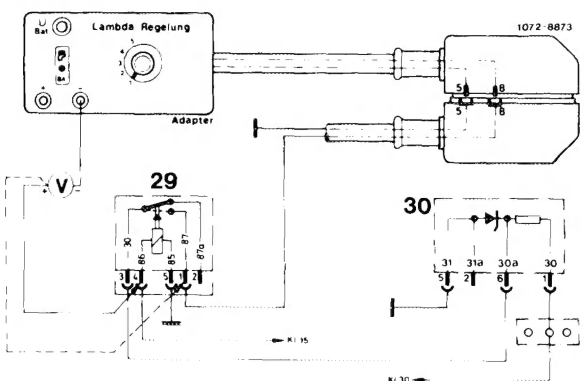
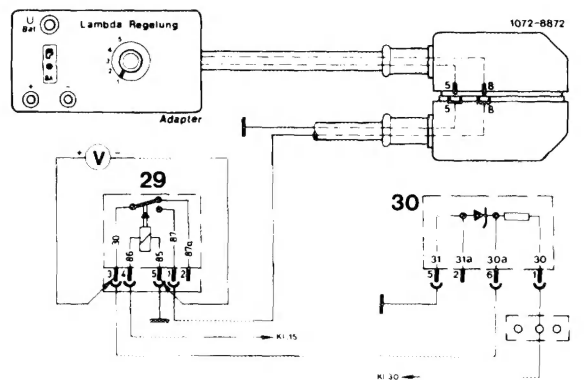
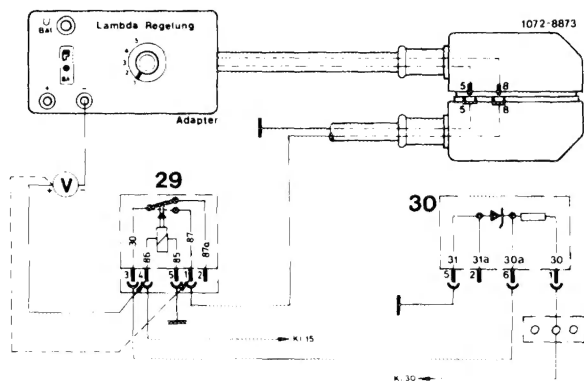
Readout  
approx. 12 volts | 0 volt

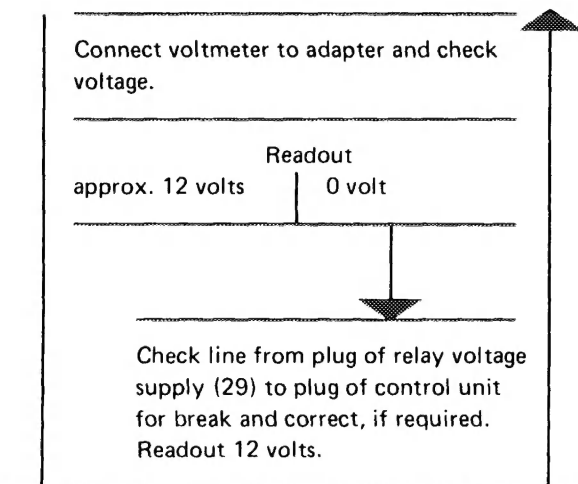
Check ground connection line (jack 5) for break and correct, if required.  
Readout approx. 12 volts.

Attach relay for voltage supply (29) to plug in such a manner that voltage on jack 1 can be measured.

Readout  
approx. 12 volts | 0 volt

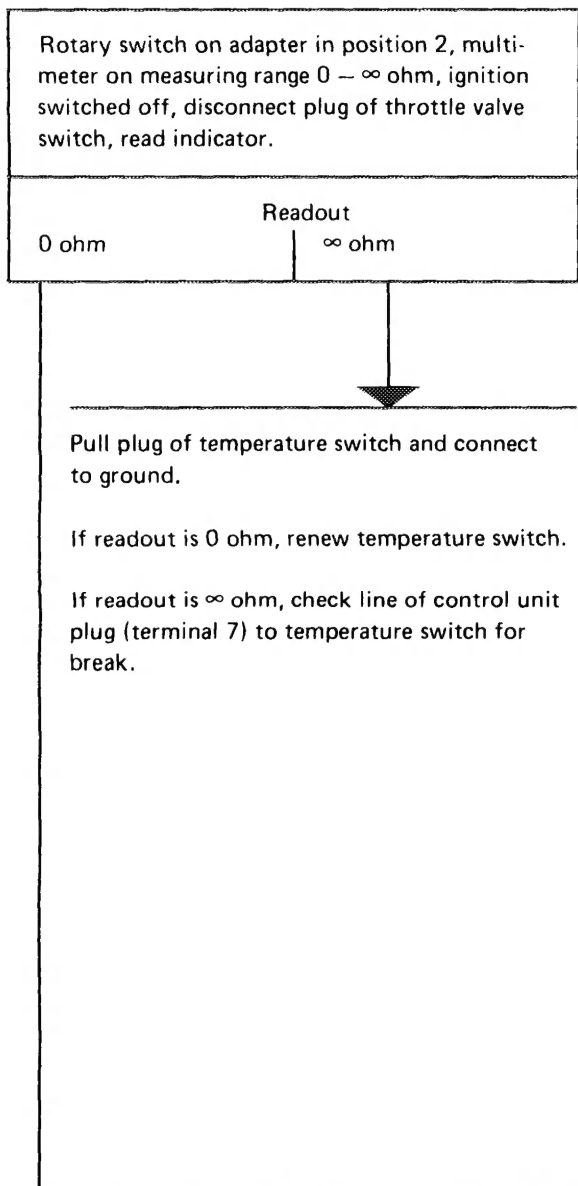
Renew relay.  
Readout approx. 12 volts.



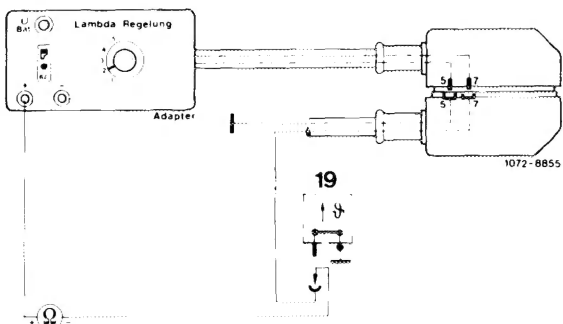
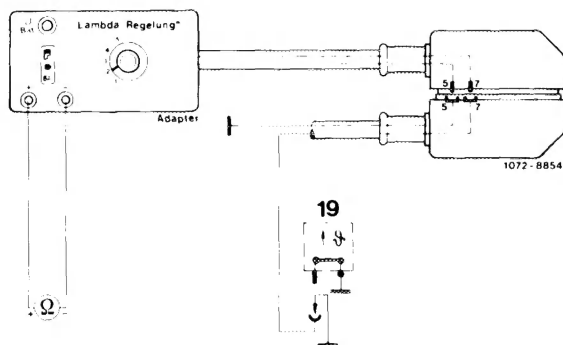
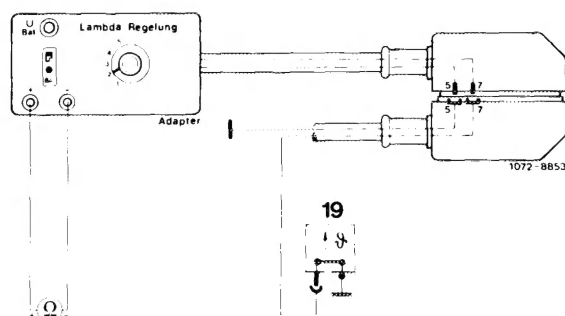
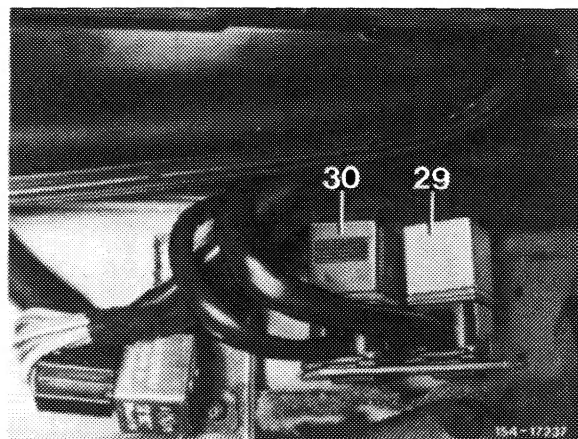


End of test

## II. Testing temperature switch oil 16 °C/61 °F (engine oil temperature < 13 °C/55 °F)



End of test



### III. Testing temperature switch oil 16 °C/61 °F (engine oil temperature > 20 °C/68 °F)

Rotary switch on adapter in position 2, multi-meter on measuring range 0—∞ ohm, ignition switched off.

Disconnect plug of throttle valve switch (arrow).  
Read indicator.

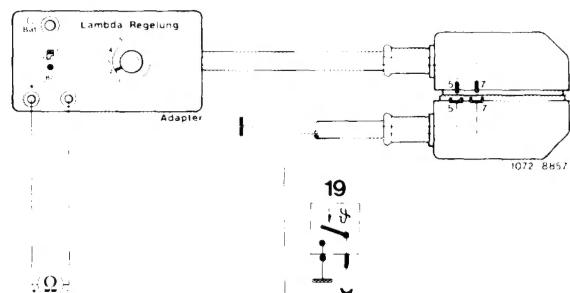
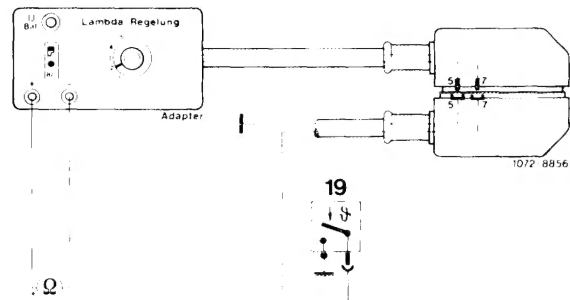
Readout	
∞ ohm	0 ohm

Pull plug on temperature switch.

If readout is ∞ ohm, renew temperature switch.

If readout is 0 ohm, check line from plug of control unit (terminal 7) to temperature switch for ground connection.

End of test



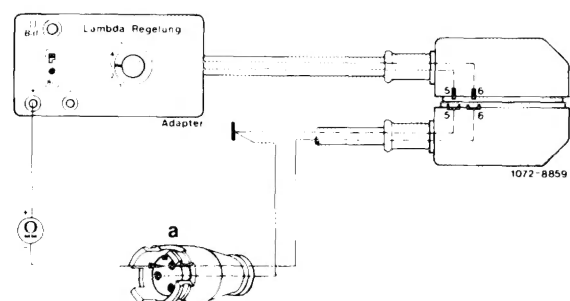
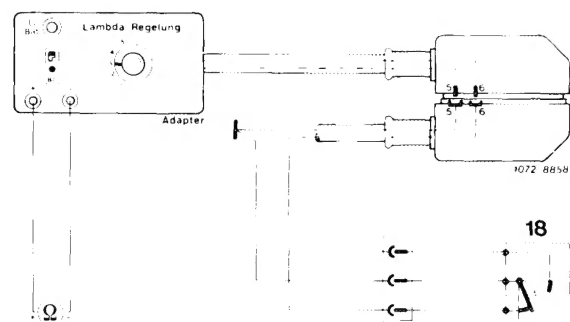
### IV. Testing throttle valve switch (idle speed stop, engine oil temperature > 20 °C/68 °F)

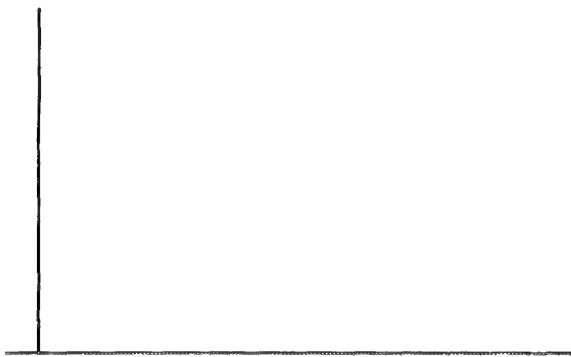
Rotary switch on adapter in position 3, multi-meter on measuring range 0—∞ ohm, ignition switched off.

Regulating linkage at idle speed stop. Read indicator.

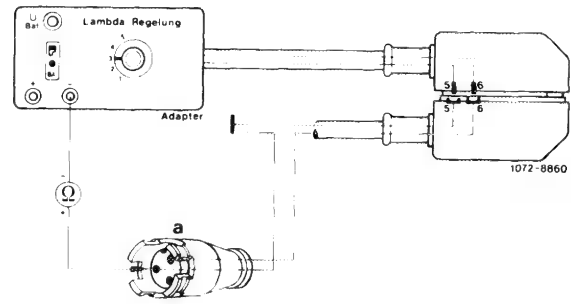
Readout	
Idle speed stop 0 ohm	∞ ohm
Lightly operate regulating linkage ∞ ohm	0 ohm

Disconnect plug of throttle valve switch.  
Check lines from plug (a) to plug of control unit (terminal 6 or 15) for break according to wiring diagram.  
If lines are in order, renew throttle valve switch.





End of test



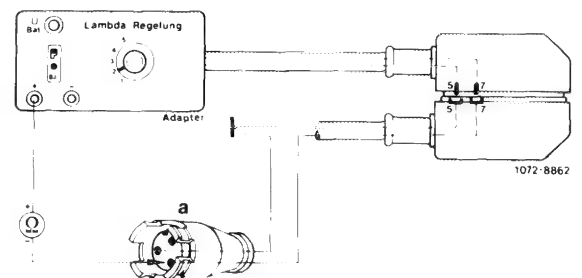
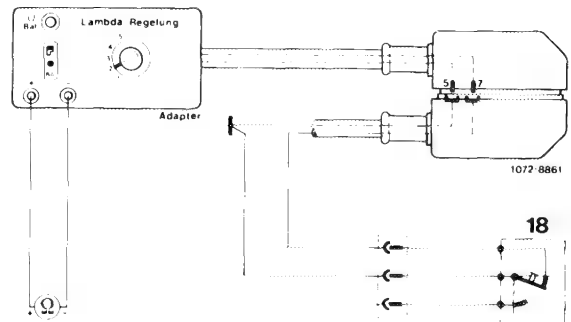
**V. Testing throttle valve switch**  
(full throttle stop, engine oil temperature  
> 20 °C/68 °F)

Rotary switch on adapter in position 2, multi-meter on measuring range 0—∞ ohm, ignition switched off.

Plug on temperature switch oil pulled off. Regulating linkage at full throttle stop. Read indicator.

Readout	
Full throttle stop	∞ ohm
0 ohm	
Slightly release regulating linkage	
∞ ohm	0 ohm

Disconnect plug of throttle valve switch. Check line from plug (a) to plug of control unit (terminal 7) for break. If line is in order, renew throttle valve switch.



End of test

## VI. Testing frequency valve

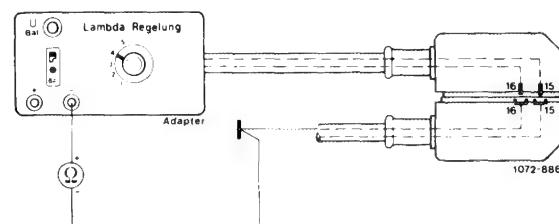
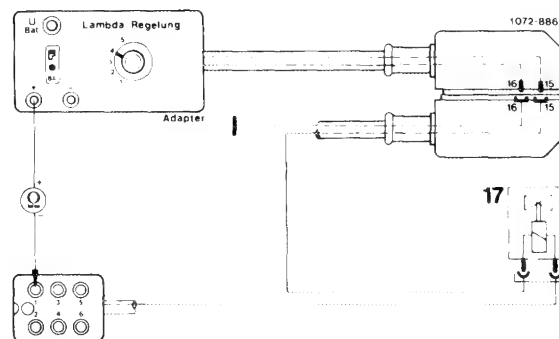
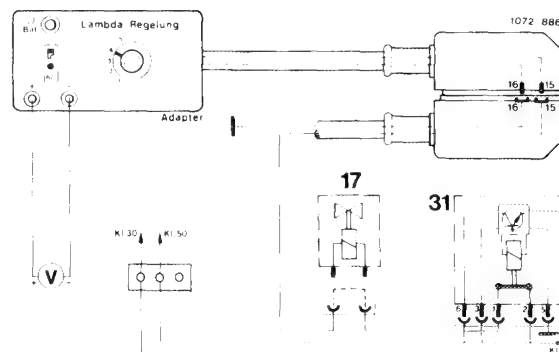
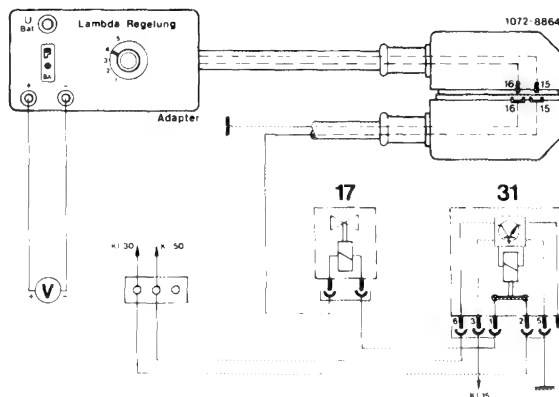
Rotary switch of adapter in position 4, multi-meter on measuring range 0–30 volts, ignition switched on, operate starter. Read indicator.

	Readout
approx. 12 volts	0 volt

Pull plug from frequency valve and bridge. Operate starter. Readout 12 volts: replace frequency valve.

Readout 0 volt: switch off ignition, multimeter to measuring range 0–∞ ohm.

Test line from plug (control unit, terminal 15) to plug of electronic fuel pump relay (terminal 1), as well as line from plug of control unit (terminal 16) to ground connection point in legroom at the right under instrument panel for break.



End of test



## VII. Testing supply line to oxygen sensor

Rotary switch on adapter in position 5, multi-meter on measuring range 0— $\infty$  ohm, ignition switched off, plug oxygen sensor disconnected. Read indicator.

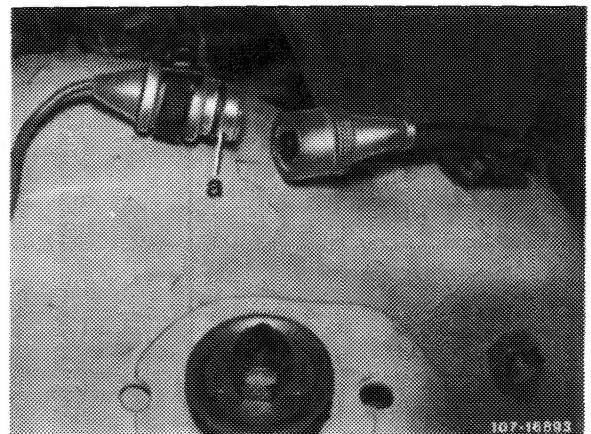
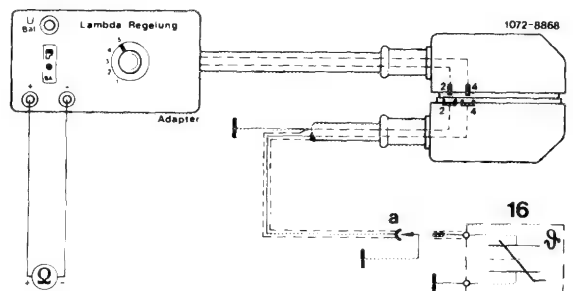
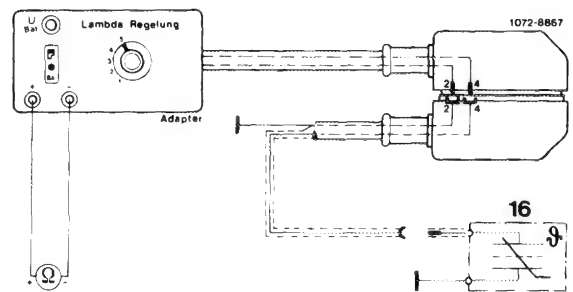
$\infty$ ohm	Readout	0 ohm
↓		

Line from plug of oxygen sensor to plug of control unit shorted.

Connect plug member (a) to ground.

Readout 0 ohm, line in order.

Readout  $\infty$  ohm, line interrupted.



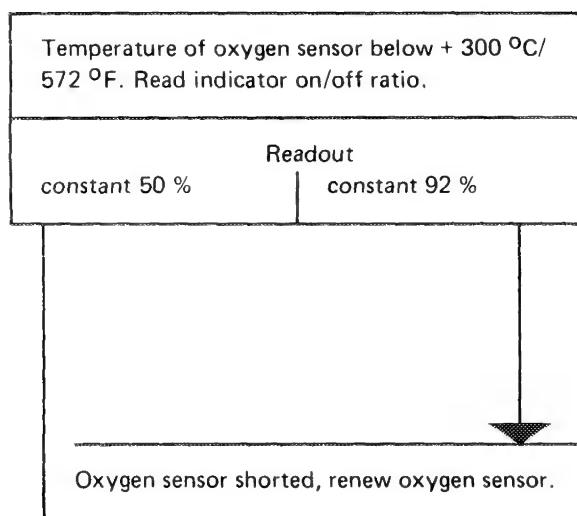
End of test

## Test section B

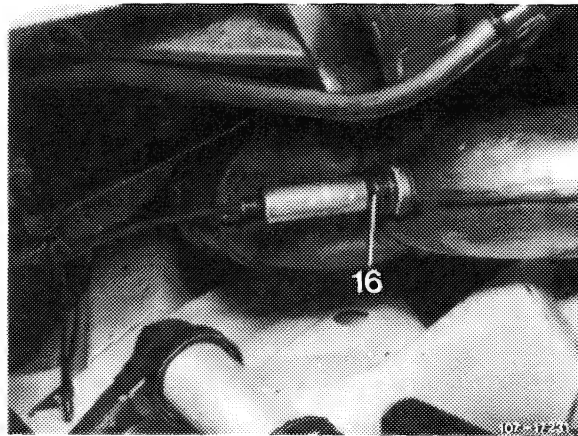
Test conditions: Remove adapter, connect plug to control unit. Connect tester on/off ratio to diagnosis socket.

Start engine (plug of oxygen sensor connected).

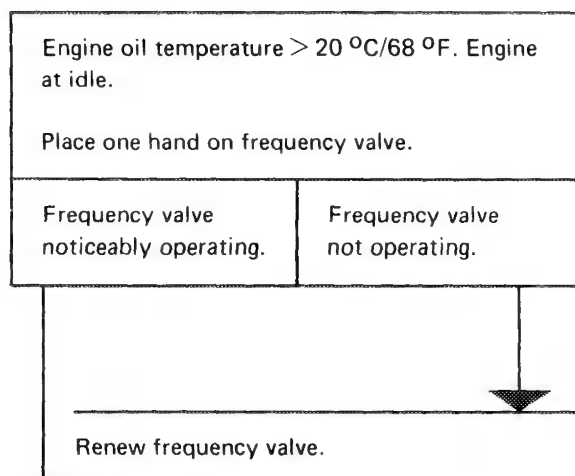
### VIII. Testing oxygen sensor



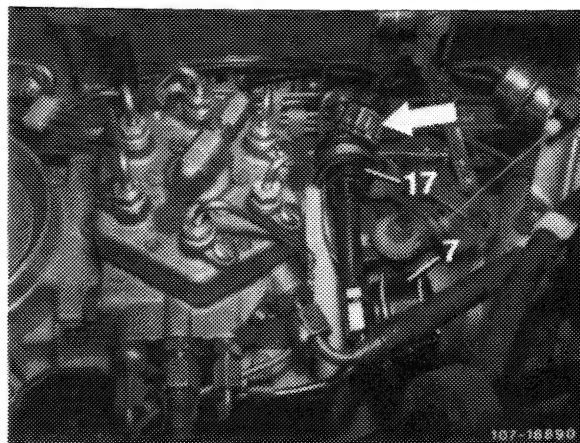
End of test



### IX. Testing frequency valve (17)



End of test



## X. Testing lambda control

<p>Engine oil temperature approx. 80 °C/176 °F. Engine at idle (750 ± 50/min).</p> <p>Read indicator on/off ratio.</p>	
<p>between 40–60 %</p>	<p>Readout &lt; 40 % or &gt; 60 % Constant 50 %</p>

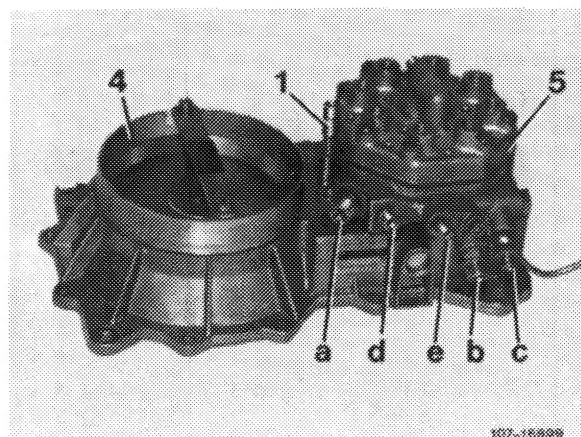
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Adjust on/off ratio on mixture regulating screw (1) in such a manner that readout is around 50 ± 5 %.

If on/off ratio cannot be regulated, check thermovalve 50 °C/122 °F (37) for passage. If passage is clear, renew control unit.

**Readout constant 50 %, oxygen sensor defective, renew.**

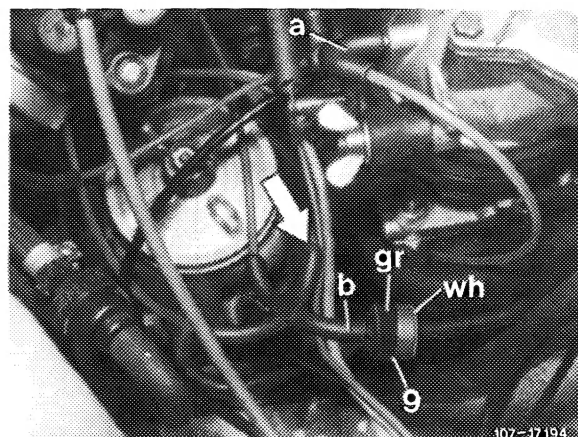
End of test



## XI. Testing air injection

<p>Engine oil temperature approx. 80 °C/176 °F, engine at idle (750 ± 50/min), pull blue/purple vacuum line (a) from air guide housing. Close vacuum line with finger for a short moment.</p> <p>Read indicator on/off ratio.</p>	
<p>Constant &gt; approx. 87 %</p>	<p>Readout Remains constant</p>

↓                      ↓



### Testing vacuum lines

The blue/purple vacuum line from air guide housing leads to straight connection of thermostatic valve (37), the blue/purple vacuum line from diverter valve (27) leads to straight connection of thermostatic valve (36).

Thermostatic valves (36 and 37) are connected to the diagonal connections by means of a 3-point distributor. From there, a blue vacuum line leads to 4-point distributor, which is connected to the intake manifold by means of orifice (9) and a rubber hose.

### Testing vacuum

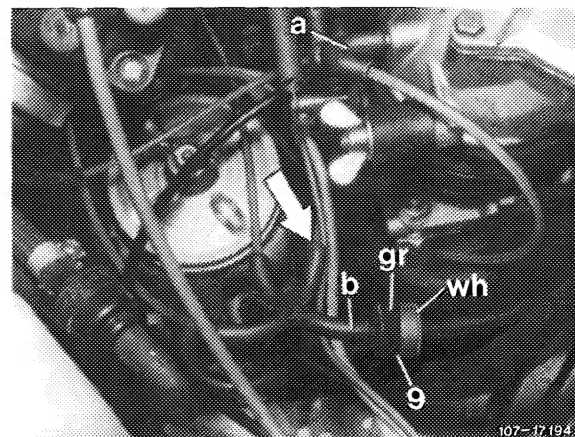
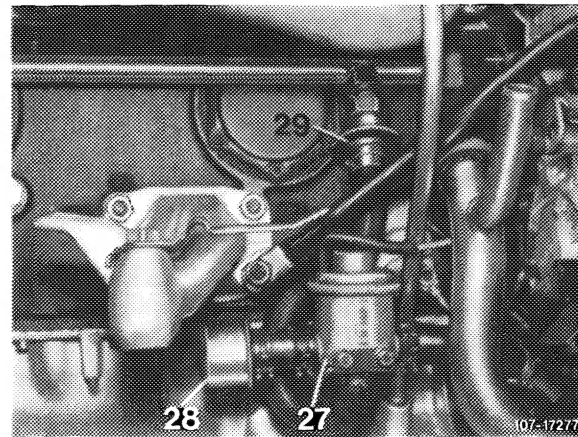
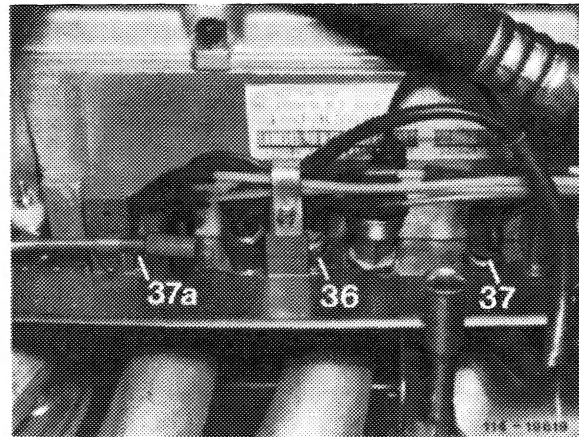
Pull 3-point distributor from diagonal connections of thermostatic valves (36 and 37) and check for presence of vacuum at distributor. If there is no vacuum: blow out connection on intake manifold with compressed air.

Check 3-point distributor, blue vacuum line, 4-point distributor, orifice (9) and rubber hose for passage.

If vacuum is present: check thermostatic valves (36 and 37) for passage and renew, if required.

If passage is available on both thermostatic valves, renew diverter valve (27).

If readout of on/off ratio is still constant upon completion of these tests, check V-belt tension and delivery capacity of air pump.



End of test

**XII. Testing fuel evaporation control system  
model year 1980**

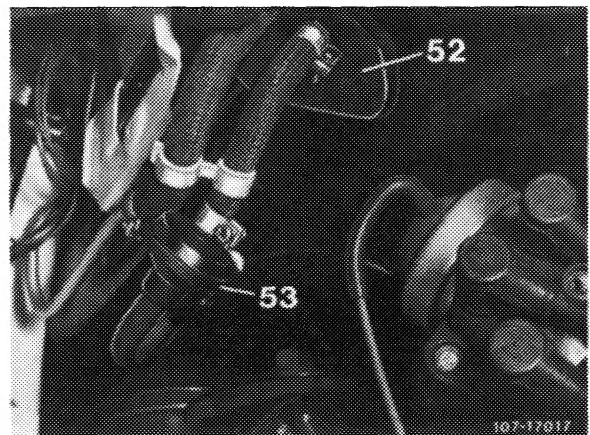
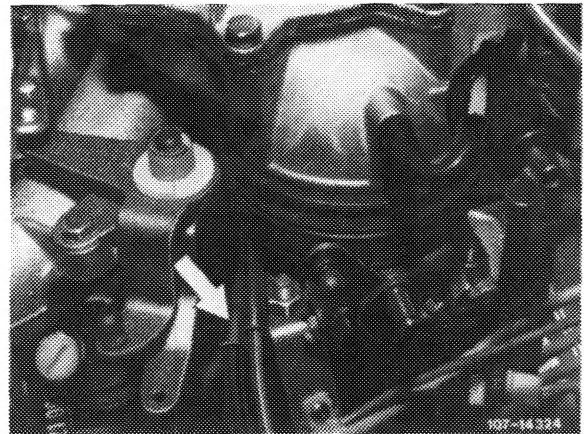
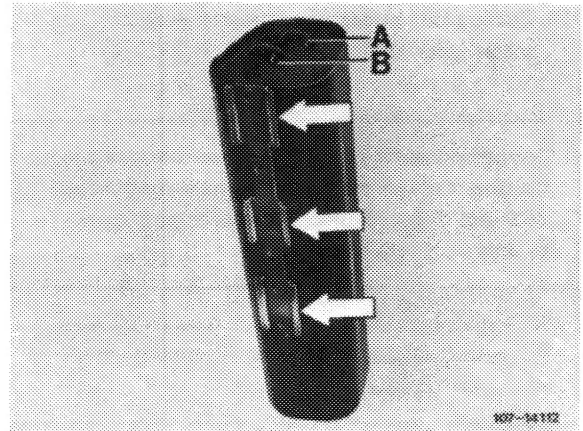
Pull draw-off hose (A) toward throttle valve housing from charcoal canister and keep closed with one finger. Slowly increase engine speed above approx. 2000/min.	
No vacuum at idle. Increasing vacuum with increasing speed.	No vacuum increase with increasing speed.

**Checking draw-off connection and purge valve**

Draw-off connection should be plugged to throttle valve housing (arrow). Check hose for leaks and blow out connection on throttle valve housing.

If there is still no vacuum, pull off draw-off hose in front of purge valve (53) and repeat checkup.

If vacuum is present, renew purge valve.



End of test



## XII. Testing fuel evaporation control system model year 1981

Pull off draw-off hose (A) toward throttle valve housing from charcoal canister and keep closed with one finger. Slowly increase engine speed to approx. 2000/min.

No vacuum at idle.  
Increasing vacuum  
at increasing speed.

No vacuum increase  
at increasing speed.

### Checking draw-off connection

Draw-off connection should be plugged to throttle valve housing (arrow). Check hose for leaks and blow through connection on throttle valve housing.

If there is still no vacuum:

### Checking thermovalve (37a) and purge valve (53)

Pull off white/purple/black vacuum line on purge valve and check for presence of vacuum.

If vacuum is present, renew purge valve, if not, renew thermovalve.

End of test

